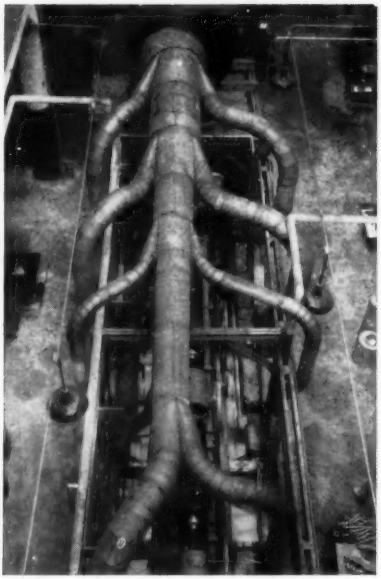
Occupational HAZARDS

There's Profit in Prevention

KIRK & BLUM

DUST AND FUME CONTROL

ENGINEERS AND CONTRACTORS



This K & B Fume Exhaust System removes acid fumes and vapors from automotive plating equipment at Chrysler's Kokomo Plant.

•

Nine K & B Dust Control Systems remove dust from boring, milling, grinding operations at the Chrysler Transmission Plant, Kokomo, Ind. Illustration shows 7 of the 9 "Cyclones" above the roof.

Clear the Air in Your Plant with KIRK & BLUM SYSTEMS

Kirk & Blum Systems remove occupational-disease-breeding dust and fumes quickly, efficiently, economically . . . and thereby PROTECT workmen and machines, provide a cleaner plant, improve working conditions, increase production, insure a better product, cut maintenance costs, save on insurance rates.

Our engineers will make a careful survey of your plant, and submit recommendations for efficient, economical dust and fume control. Write for details and interesting illustrated books.

THE KIRK & BLUM MFG. CO.

2802 Spring Grove Ave. • Cincinnati, Ohio

Chicago: C. P. Guion, 1661 N. Milwaukee

Pittsburgh: Bushnell Mchy. Co., 311 Ross St.

Louisville: Liberty Eng. & Mfg. Co., Inc., 1450 S. 15th St.

EBB Dec 10, 1940

When One Toe Is Smashed

A SCREAM of agony. You pity him. He'll be laid up for two, three . . . maybe five weeks. But, what about your side of the picture?

You pay the hospital bill! You pay compensation during his layoff. And how about the lost time in training a new man to take the injured worker's place?

Cut your hospital and compensation costs by having *all* your workers wear Hy-Test Safety Shoes. Their steel "turret-top" toe protects even under terrific blows. Hy-Test shoes have other rugged safety features, too. Yet many styles are just as good-looking and comfortable as ordinary shoes . . . and cost no more!

The complete Hy-Test line will be on display at Booth 111—28th National Safety Congress and Exposition, Atlantic City, N.J., October 16 to 20.

HY-TEST HEROES

The sturdy steel toe cap in this Hy-Test shoe saved amputation when a 1400 pound casting dropped on its wearer's toe.

A 4500 pound truck rolled over the steel "turret-top" toe of this Hy-Test shoe, but there was no injury. No lost time.

Here's the Reason Why

Hy-Test's "turret-top" toe of steel, roomy for comfort, sturdy for safety, anchored securely by the flange.

HY-TEST SAFETY SHOES

Designed and Manufactured Exclusively by Hy-Test Division, The International Shoe Co., St. Louis, Mo., The World's Largest Shoe Manufacturer

The publications briefly described in this service department are prepared by manufacturers' technical experts. The data they contain on equipment supplies and prevention methods applies to varied phases of occupational hazard problems.

185—SAFE HANDLING OF ACIDS
Information on the safe handling of acids and chemicals is provided in the new folder just issued by Pulmosan Safety Equipment Corp. In addition to general information about handling such chemicals, specific information is given about equipment to be used in such handling.

186—PERSONAL PROTECTION
A new book covering the complete line of safety equipment has been issued by the American Optical Company. Described therein are eye protection, helmets and shields, first aid kits, respirators and hoods, gloves, aprons, and other safety clothing.

187—LAMP GUARDS
A complete line of guards for electric lights is described in a brochure issued by the McGill Manufacturing Co. Feature of the new type of guards is that they lock on, thereby preventing unauthorized removal.

188—ELECTRICAL BREAKERS
General Electric has prepared a catalogue of various types and sizes of electrical breakers, which contains valuable information and specifications for electrical control.

189—ENCLOSED MOTORS
General Electric also announces a new catalogue of totally enclosed, fan-cooled induction motors. These motors have a variety of applications in situations where safety is a factor, and are important in preventing certain types of hazards.

190—FIRST AID EQUIPMENT
A complete handbook of industrial first-aid supplies is available, and which offers information about all types of first-aid and allied equipment. Issued by the Davis Emergency Equipment Co.

191—TRANSPORTATION EQUIPMENT
The Melflex Products Company have available for distribution literature describing their safety equipment for use in public and industrial conveyances.

192—FIRE
The General Fire Truck Corp. offers a bulletin describing various types of fire extinguishers, as well as their new Life-Guard Two Bomb Fire Warning for industrial plants.

193—DISPENSERS
A line of hand dispensers for employee use with Boraxo is described in the folder just issued by the Pacific Coast Borax Company.

194—MAINTENANCE
Over the Rough Spots is the title of an illustrated book for maintenance men, published by the Stonehard Company. The book and the photographs it contains are designed particularly to give needed information to maintenance men, and is said to give straight facts about maintenance problems.

195—SAFETY SHOES
Foot safety and comfort; a description of the utility and safety of industrial shoes is contained in the new folder of the International Shoe Co.

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FL-13

SYMPOSIUM FOR INDUSTRIAL NURSES

THE Department of Public Health of the State of Illinois will conduct the first annual Symposium for Industrial Nurses at the University of Illinois Medical School, 1853 West Polk Street, Chicago on October 26, 27, and 28. The Symposium will be under the direction of the Division of Industrial Hygiene and the Division of Child Hygiene and Public Health Nursing, it is announced by A. C. Baxter, M.D., Director.

Collaborating with the State Departments will be the Chicago Industrial Nurses Association, Greater Chicago Safety Council, Illinois Manufacturers Association, American Medical Association, and the University of Illinois Medical School.

PROGRAM •

Thursday Afternoon
October 26

PRESIDING—Dr. C. C. Applewhite, Regional Consultant, U. S. Public Health Service, Chicago

ADDRESS OF WELCOME—Dr. D. J. Davis, Dean, College of Medicine, University of Illinois

"MODERN TRENDS IN INDUSTRIAL NURSING SERVICES"—Miss Johanna Johnson, R.N., Supervisor, Nursing Service, Employers' Mutuals Insurance Co., Wausau, Wisconsin

"AS THE STATE DEPARTMENT OF PUBLIC HEALTH VIEWS THE INDUSTRIAL NURSE"—Miss Maude B. Carson, R.N., Chief Supervising Nurse, Illinois State Department of Public Health, Springfield

"THE ROLE OF THE UNIVERSITY IN THE PREPARATION OF THE INDUSTRIAL NURSE"—(Speaker to be announced)

"THE VIEWPOINT OF THE AMERICAN MEDICAL ASSOCIATION"—Dr. Carl M. Peterson, Secretary, Council on Industrial Health, American Medical Association, Chicago

Friday Morning
October 27

PLANT VISITS—(3 groups, number limited)—Crane Company, 4200 South Kedzie Ave., Chicago; Western Electric Company, Cicero & 22nd Street, Chicago; International Harvester Company, 26th & Blue Island Ave., Chicago

Friday Afternoon

PRESIDING—Mr. Warren A. Cook, President-elect, American Industrial Hygiene Association

"WHAT THE NURSE SHOULD KNOW ABOUT THE COMPENSATION LAW"—Hon. Peter J. Angsten, Chairman, Industrial Commission of Illinois

"NEW DEVELOPMENTS IN THE STATE DEPARTMENT OF PUBLIC HEALTH THROUGH THE SOCIAL SECURITY ACT"—Dr. Grace Wightman, Chief, Division of Child Hygiene and Public Health Nursing, Illinois State Department of Public Health, Springfield

"THE VALUE OF RECORDS IN INDUSTRY"—Dr. M. H. Kronenberg, Chief, Division of Industrial Hygiene, Illinois State Department of Public Health, Chicago

"SOCIAL SERVICE AGENCIES AND THE INDUSTRIAL NURSE"—Chicago Area—Mr. Alexander Ropchan, Secretary, Health Division, Council of Social Agencies, Chicago; Downstate Area—Miss Ruth Bartlett, Illinois State Department of Public Welfare, Springfield

[*Continued on next page*]

✓ PENETRATION
✓ PORE-SEAL
✓ COLOR
✓ CLEANLINESS
✓ DUSTLESSNESS
✓ WEAR-RESISTANCE
PLUS
Safety

PIGMENTED
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A PREFERRED FINISH FOR CONCRETE FLOORS

PIGMENTED FILPOR, a penetrating liquid preservative, produces a *non-slippery finish* in which safety engineers have a particular interest. It is not a *paint* but a combination of vegetable oils, gums and solvents to which color pigments are added. It enters the pores of the floor and binds the surface particles of the concrete and forms a hard surface film.

Porous floors cake up with grease and oily dirt and are difficult to clean. By finishing the floor with PIGMENTED FILPOR, the pores are tightly sealed and lower maintenance costs will result.

To seal the pores of wooden floors and to enhance the natural beauty of the wood grain, CLEAR FILPOR is suggested. It is highly resistant to wear and tear and will seal up the pores of the wood and help prevent oil, dirt and grease from damaging the floor itself.

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Please send me your FREE booklet THE PROPER MAINTENANCE OF FLOORS.

Name of Individual .....
Name of Company .....
Street and Number .....
City and State .....

Friday Evening

DINNER MEETING—Chicago Womens Club, 72 East 11th Street, 6:30 P.M.

PRESIDING—Dr. Albert C. Baxter, Director, Illinois State Department of Public Health, Springfield

"THE MEDICAL DIRECTOR EVALUATES THE NURSE IN INDUSTRY"—Dr. Joseph H. Chivers, Medical Director, Crane Company, Chicago

"THE NURSE'S VALUE TO INDUSTRY FROM THE EMPLOYER'S VIEWPOINT"—Mr. Harry Guilbert, Director, Safety and Compensation, The Pullman Company, Chicago

"OPPORTUNITIES FOR HEALTH EDUCATION IN INDUSTRY"—Mr. B. K. Richardson, Chief, Division of Public Health Instruction, Illinois State Department of Public Health, Springfield

Saturday Morning, October 28

PRESIDING—Dr. Lloyd Arnold, Professor, Department of Bacteriology and Public Health University of Illinois, College of Medicine

"THE INDUSTRIAL NURSE AS A TEACHER OF NUTRITION"—Miss Leone Pazourek, Nutritionist, Illinois State Department of Public Health, Springfield

"PERSONNEL PROBLEMS AND THE INDUSTRIAL NURSE"—(Speaker to be announced)

"THE COMMUNICABLE DISEASE PROBLEM IN INDUSTRY"—*"PNEUMONIA,"* Dr. H. A. Lindberg, Director, Section on Pneumonia Control, Illinois State Department of Public Health, Chicago; *"TUBERCULOSIS,"* Dr. Ellis B. Freilich, Consultant, Chicago; *"VENEREAL DISEASE"*—Dr. Albert E. Russell, U. S. Public Health Service, Chicago; "SUMMATION," Mrs. Corrine R. Robinson, R.N., Consulting Nurse, District 1, Illinois State Department of Public Health, Chicago.

Protectors In Standard Safety Code

This is the sixth in the series of recommended protectors as set forth in the revised copy of "The American Standard Code for the Protection of Head, Eyes and Respiratory Organs."

Air Line Respirator

General—These respirators shall be constructed in all their parts of materials obviously suitable for the purpose they are to serve. This applies to the fabric, rubber, metal, and other parts. All rubber parts that come into contact with the skin shall be of a nonirritating composition. Rubber except rubber used in hose, shall meet the requirements mentioned above. The rubber and metal parts shall withstand sterilization.

Parts—The respirator shall comprise a facepiece with head harness, exhalation valve, and a breathing tube. The breathing tubes shall connect to a hose, which shall be supported so as to permit free head movement and not be subject to closing off by kinking or by chin or arm pressure while the respirator is being worn. The hose shall be supplied with respirable air under positive pressure.

Facepiece—The distribution and velocity of the air within the facepiece shall be such as not to cause discomfort to the wearer. The head harness may consist of elastic headbands which are adjustable and replaceable.

Breathing tubes—The breathing tube may be an extension of the type of hose used for conveying the air from the point of supply, or it may be one or two lengths of flexible, nonkinking hose that extends from the facepiece to a point of connection on the belt or harness.

Supply Hose—The supply hose shall comply with United States Bureau of Mines tests. When tested as an assembled part of the respirator and connected to an air supply at the operating pressure specified by the manufacturer, the air flow shall be not less than 6 cu. ft. (170 litres) per min. with adjustments or regulators open, nor less than 2 cu. ft. (57 litres) per min. with adjustments and regulators in the closed position. Any source of safe, respirable air at the elevated pressure required for proper operation may be used. It is recommended that a separator trap be provided to intercept oil, water, and other extraneous matter.

Valves, Couplings, and Air-Regulating Mechanism—The respirator shall be equipped with a convenient, durable, and dependable mechanism for controlling the supply of air to meet the demands of the wearer. Suitable means shall be provided to guide the wearer in the adjustment of the device to an air-flow that does not permit a negative pressure within the facepiece at any instant of inspiration. It shall also control the positive pressure within the facepiece to a value not in excess of one inch (25 mm) of water column with an air flow into the facepiece of 6 cubic feet (170 litres) per

"BURNITOL"

Paper Cuspidors

For economical plant sanitation

BE SAFE! BE CERTAIN!
"BURN—IT—ALL!"

PROTECT workers' health. Promote plant cleanliness and sanitation. Replace unhealthful metal containers and eliminate costly, messy cleaning jobs. **It's Easy and Economical!** Just place "BURNITOL" Paper Cuspidors around machinery and other places within easy reach of workmen.

"BURNITOL" Paper Cuspidors are water-proofed, wire stitched, substantial. Cost only a fraction of a cent, more than pay for themselves. Used by leading manufacturers everywhere. Size 6½" x 6½" x 3". Three grades.

No. 7 per 1M—$13.00 **No. 8 per 1M—$8.10**
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BURNITOL MANUFACTURING CO.
34 SULLIVAN SQ. **BOSTON, MASS.**

minute. This may be in the form of a simple regulating valve in the supply line at the belt, and a relief valve on the facepiece which will indicate the required slight excess by remaining in an open position through the entire cycle of breathing, or any foolproof telltale control or indicating device.

The respirator shall also be equipped with an air-limiting valve or mechanism which will limit the supply of air to not less than 2 cubic feet (57 litres) per minute nor more than 20 cubic feet (566 litres) per minute if connected in the recommended manner to an air supply at the operating pressure specified by the manufacturer.

If the specified operating pressure is in excess of 5 pounds per square inch (0.35 kg. per sq. cm.), a pressure-release mechanism shall be provided which will prevent the pressure at the airflow adjustments or regulators from exceeding 25 pounds per square inch (1.75 kg. per sq. cm.).

For the purpose of these requirements the operating pressure is that pressure existing in the hose at a point down stream

from the general air supply or any pressure reducing valve.

A hand-operated detachable coupling by means of which the wearer can easily and quickly make attachment or detachment at a point near the harness shall be provided. This coupling shall be durable, remain connected under all conditions of reasonable use of the respirator, and meet all the tests for strength and tightness.

JUDGING from some of the pictures we've seen taken on the Boardwalk at Atlantic City (where, as you know the National Safety Congress is to be held the 16th to 20th of October), there exists a certain kind of hazard for one and all men between the ages of 13 and 75. We're frank to confess that we don't know what preventive measures should be used to protect our fellow confrerees.

And as far as we, personnally, are concerned, we're glad we don't!

ONE THIRD of all reported fires in industrial and mercantile properties during the past four years were extinguished by hand fire extinguishers. How's this for proof that it's wise to have enough *good* fire extinguishers, in good condition, with people who know how to use them?

THE QUEBEC ASSOCIATION for the Prevention of Industrial Accidents doesn't take any chances. They have issued a small poster for use in industrial plants, cautioning all workers to report and care for, promptly, any injury—cut, scratch, burn, etc. Which is not unusual. But this poster is printed in six languages; English, French, Polish, Italian, Russian, and one other that no one around here can identify.

MR. CHARLES L. HUSTON, JR., has been appointed Director of Personnel of Lukens Steel Company, Coatesville, Pa. Mr. Huston was formerly with the American Rolling Mill at Dayton.

CONGRATULATIONS are due the steel industry. They improved their safety record 20% in 1938, which makes them third highest of all industries, exceeded only by Tobacco and Cement.

WE ALL REGRET that conditions throughout the world have made it necessary to cancel the 13th Annual Safety Conference, which was to have been held at the Mount Royal Hotel, Montreal, October 26, 27, 28. This Conference has in past years, been of great value to those interested in Canadian safety work, as well as to others throughout the world.

WE ARE IN RECEIPT of an awfully nice note from Mr. L. Roy Riddick of the Strachan Shipping Company, of Savannah, Ga., who says that he enjoys reading *Occupational Hazards* and finds it very helpful. Comments on the fact that he had a problem that we were able to help him on recently.

Thanks for them kind words, Mr. Riddick and we hope we can help you again.

ANOTHER RECENT LETTER from K. J. Butler, of The Peck, Stow & Wilcox Company, Southington, Conn., comments on the size of *Occupational Hazards* and says he doesn't want to have it changed, because it is so easily filed away for future reference, easy to carry, and easy to read.

O.K., Mr. Butler, we won't change. We like the size also because it forces us to keep the articles short and to the point.

YOU'LL NOTICE that we've changed our name—effective this issue. We found that most everyone referred to us as "Occupational Hazards," so we decided to make it easy for you. Besides the word "Safety" was superfluous—"Occupational Hazards" includes afety.

HAVE YOU?

Have you made your plans to come to the National Safety Congress to be held in Atlantic City October 16 to 20. At the meetings profitable and modern methods of preventing occupational hazards in many fields will be discussed.

He can't run a factory

These modern microbe-men probably wouldn't know a drill press from a turret lathe. But they certainly do know how to analyze and compare products in a laboratory. They say that for removing grease, grime and dirt—and infection-inviting bacteria, you can't improve on formula SBS-11. It replaces ordinary soap, costs less than 1¢ a week per employee. Used today in 2813 plants. Write now for generous free trial supply for your plant employees, both male and female.

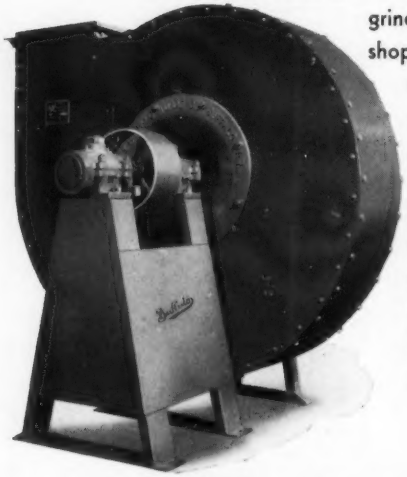
FORMULA SBS-11

The WASHWORD of Industry

SUGAR BEET PRODUCTS COMPANY
300 WALLER STREET - SAGINAW, MICH.

Why Have a DUSTY FACTORY When You Can Keep the Air Clean with "Buffalo" EXHAUSTERS

Dust is a fire hazard. Dust impairs the health of your workers. Dust slows down production. Dust increases operating costs. This expensive "star boarder" can be kept out of your plant by installing Buffalo Steel Plate Exhausters wherever dust is created—at your grinding wheels, in your woodworking shops, where lint collects, in all places where waste materials of a dusty nature result from a manufacturing operation.



Exhausters have reversible housings adjustable to either rotation and any discharge. There is a wide range of sizes. Why not let these better exhausters solve *your* dust collecting problem now.

WRITE FOR BULLETIN 410-F

BUFFALO FORGE COMPANY

191 Mortimer St. Buffalo, N.Y.
Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co. Ltd., Kitchener, Ont.

Occupational HAZARDS

OCTOBER 1939

Volume 2 Number 1

CONTENTS

PLEASE NOTE. The name of this magazine is now OCCUPATIONAL HAZARDS. We have dropped the words "AND SAFETY" from the title. Most people referred to the magazine with the shortened title, and since occupational hazards means and includes safety, the continuance of this word in the title is redundant. OCCUPATIONAL HAZARDS will continue to present the theme—"There's Profit in Prevention." The editorial material will continue to present engineering methods for reducing industrial hazards.

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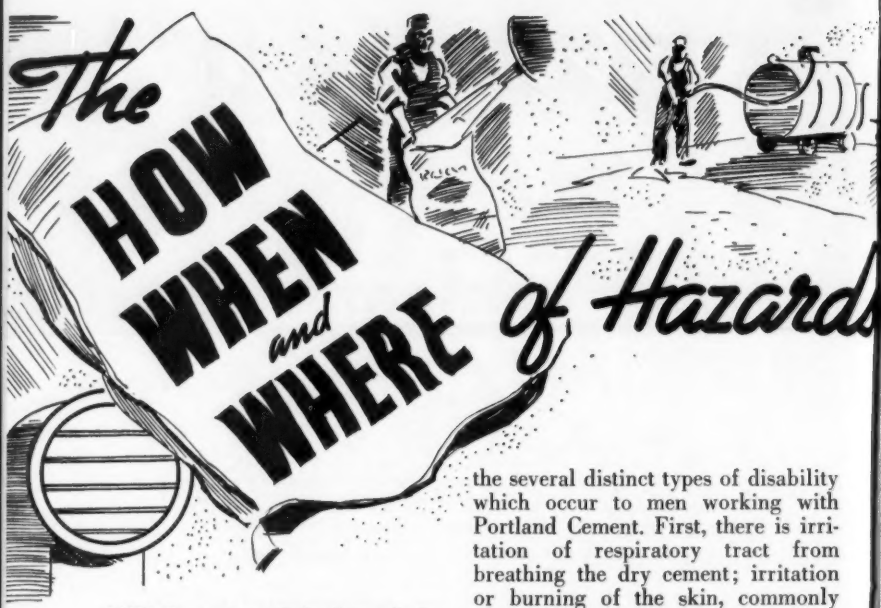
812 Huron Road, Cleveland, Ohio

Irving B. Hexter, President — L. P. Aurbach, Vice-President
W. S. Padworth, Associate Editor — Ralph Phelps, Representative



ANY discussion of the hazards inherent in the cement industry must take into account the raw materials handled. Certain hazards obtain by the very nature of these raw materials, which usually are limestone, shale, clinkers, silica sand, slag, gypsum (usually hydrous aluminum silicate). When processed, the mixture is calcined and the resulting compound is essentially calcium silicates.

The silica and the free alkali content are low, but the calcium silicate itself may act as an alkaline irritant.

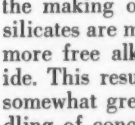
Upon the addition of water, as in the making of concrete, the calcium silicates are modified so as to produce more free alkali as calcium hydroxide. This results in the creation of a somewhat greater hazard in the handling of concrete than in cement.

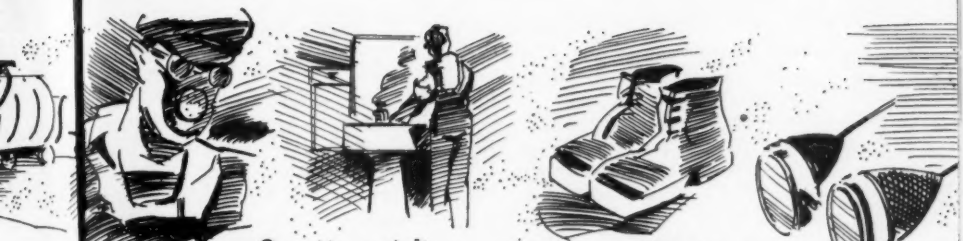
We must concern ourselves with the several distinct types of disability which occur to men working with Portland Cement. First, there is irritation of respiratory tract from breathing the dry cement; irritation or burning of the skin, commonly called "cement burn," either from contact with cement dust or green concrete; conjunctivitis, irritation of the eyes; clogging of the ear, which may be mistaken for deafness; and the rheumatic conditions of rheumatism, neuritis, and arthritis.

RESPIRATORY DISEASES

Medical authorities agree that persons who breath air which contains a high concentration of dust, over considerable periods of time, are more subject to certain respiratory diseases, such as influenza, bronchitis, asthma and pneumonia, than those who work in non-dusty occupations.

Of all the types of disability mentioned above, the respiratory diseases are the most important primary causes of absence from work. Of these res-





rds in the Cement Industry

piratory diseases, pneumonia is first in severity and mortality (and is abnormally high), while head colds and influenza are the most numerous causes of absence.

Strictly speaking, the cement industry is not productive of silicosis. The free silica content of cement as it is processed is negligible. Rarely has the free silica content of cement dust in the air exceeded two per cent. Because cement is of the absorptive group of dusts, and, therefore, cannot be classed with silica or other proliferative dusts. Instead of the condition induced by silicotic dusts, the effect of cement dust on the respiratory tract is most likely due to irritation caused by chemical action.

Causes

Respiratory irritations in the manufacture of cement are usually found in places of the highest dust concentrations: sorting bags, loading railroad cars, cement "kitching," unloading empty bags, and sewing empty bags. Little, if any, medical or engineering evidence can be found at present to require a dust concentration in cement plants below 100,000,000 particles per cubic foot of air of a size less than ten microns. This is due to the fact that only *traces* of free silica are found in cement dust in the air, and that this dust is soluble.

The following preventive measures are efficacious in prevention of respiratory diseases:

1. Adequate general ventilation.
2. Local exaust ventilation.
3. Application of wet methods.
4. Good housekeeping methods, including vacuum cleaning.
5. Enclosed processes.
6. Personal protective equipment, as for instance, respirators, to supplement mechanical ventilation where it is impracticable.

CEMENT DERMATITIS

Workers who come in contact with the dry dust develop a non-disabling dryness of the skin. Boils and pinhole ulcers result from cement getting into the pores and clogging them. This occurs more often when the workers perspire freely. The "cement burns" appear to be the result of a chemical action when the free alkalies

present in the cement react with the body perspiration or other moisture. This is aggravated where the clothing chafes the skin.

In addition to the above types of disabilities which arise from contact with the dry cement dust, the mixing and placing of concrete produces a still different type of injury. This comes from a combination of the chemical action of the cement combined with the mechanical abrasion of the concrete aggregate. Wet concrete in the shoes or on the clothing of the workers produces disabling injuries.

Investigations have shown that the cement dermatitis of a disabling nature is more frequent in work where the men live in temporary quarters than in permament plants. This is based on two conditions: (1) better bathing facilities, and (2) better control of the dust in permanent plants. It is also probable that employees of permanent plants are more particular concerning their personal hygiene.

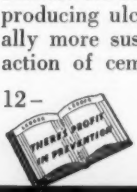
Causes of Disability

The action of cement in producing various degrees of skin irritation is both mechanical and chemical. Cement in the shoes, clothes, etc., acts as a mechanical irritant in those regions where movement of the wearing apparel produces friction. This action often causes breaks in the continuity of the skin. In addition to this, cement is a chemical irritant especially severe upon a surface where the skin is broken. Slight abrasions of the skin are serious, for they permit chemical action of the cement beneath the surface of the skin, often producing ulcers. A dry skin is usually more susceptible to the irritant action of cement than an oily one. In this connection, the particularly hazardous occupations are in the floating gang, where clothes and shoes of workers come in contact with the wet cement mixture; and in the mixing house, where the cement dust liberated from the handling of the bags settles on the exposed parts of the men, and comes in contact with perspiration, with a resultant chemical action.

Prevention

In general, the preventive measures are those of the control of the dust at its source; personal protection and hygiene; provision of wash rooms equipped with ample facilities for bathing and washing. The men should be required to bathe after work, and before starting work to use a small amount of lanolin, possibly mixed with castor oil. Or, petroleum jelly or any similar substance may be used. Specific preventive measures are:

1. Control of dust at source, and by enclosing the process.
2. Personal hygiene; provision of proper bathing facilities; use of protectant creams before starting work.
3. Clothing should be in good condition; frequent changes; protective clothing for special operations: gloves, aprons, boots, etc.
4. Showers and lockers to encourage frequent bathing and changing of clothes.
5. Avoid letting men work who have cracked or broken skin; sores or blisters.
6. Proper and complete reporting of any and all skin conditions.
7. Treatment by a physician of any stage of dermatitis, or other wound.



EYE DISORDERS

Eye trouble in the cement industry is generally confined to conjunctivitis, due to cement dust impinging on the eye and irritation setting in. The chief location of this is among the packers, where small holes in bags may permit a stream of dust to spray in the direction of the eyes. Another cause of irritation (at any point in the plant) is a worker rubbing his eyes. Cement is caustic, scratchy, and sometimes warm, and great care must be taken to avoid touching the face or eyes with the hands. Particular care must be taken about the eyes when there is perspiration present.

The handling of bags, both full and empty, is one of the principal hazards in the cement industry.

Eye trouble can be prevented through the intelligent use of goggles, and by enforcement of rules for wearing goggles. Also, instruction of men against rubbing eyes, reporting all eye irritation and inflammation, and adequate first-aid equipment, including liberal quantities of boric acid solution. Eye disorders should be treated by a physician.

Rheumatism, Neuritis, Arthritis

Rheumatism, neuritis, and arthritis are a chief cause of disability among workers exposed to wet, damp, or extreme temperature conditions. Cement workers are subject to these conditions. Recent studies have shown that these items are fifth in rank in the twenty most frequent causes of disability. Certainly a part of such disability is caused by extra-occupational conditions, but it is certain that the above mentioned conditions are conducive to rheumatic disability. The chief cause of this condition is rapid cooling of the worker after heavy labor and sweating. Also, working in the quarry or pit in the presence of moisture causes a considerable amount of this disability.

Prevention

Prevention of the rheumatic disabilities should include:

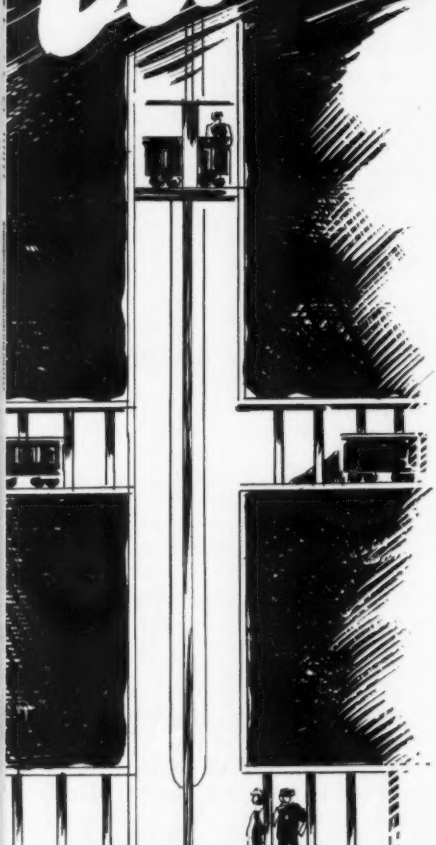
1. Personal hygiene in bathing and changing to clean, dry clothes after becoming wet through perspiration or other causes.
2. Ample washing facilities to encourage good personal hygiene.
3. Ample lockers to provide sufficient clean clothing.
4. Protective clothing, especially warm and waterproof clothes for work in cold or damp and wet places.

EAR TROUBLE

Cement workers sometimes complain of deafness, but investigation usually reveals a clogging of the ear by cement dust. It is largely a matter of personal hygiene. Dust must not

[*Continued on page 40*]

Air Hygiene



We present here the man who is probably the outstanding medical authority in the field of lung infections. His point of view is that of a physician and, as such, this article will be of extreme interest to management with these problems.

LIKE all higher animals man has evolved in an environment polluted by variable amounts of dust. As a consequence he has developed mechanisms which prevent his lungs from becoming clogged with foreign materials which would interfere with their proper function. These mechanisms include filters which exclude many particles from entering the respiratory tract, a special type of ciliated cell lining the larger air tubes whose activities carry dust particles away from the lung, free moving mobile duct cells or phagocytes, which gather up and carry particles out of the pulmonary air spaces and finally a drainage lymphatic system to transport foreign matter to nodes located outside the lungs. These combined mechanisms provide adequate protection against ordinary atmospheric pollution, but industry has created such high concentrations of dust in the atmosphere that the protective devices can fail and dust accumulates inside the lungs.

in Mining . . .

The introduction of pneumatic drilling in mining created a management problem

By LEROY U. GARDNER, M.D.
Director, Edward L. Trudeau Foundation, Saranac Laboratories

From a paper presented at the Metal Mining Convention of the American Mining Congress.

Mining is one of the oldest industries where hazards of this kind have occurred largely because of the lack of ventilation. For centuries disease of the lungs was accepted as an inevitable consequence of underground employment. Fortunately disease must have developed slowly, for hand drilling produced comparatively little dust and human tolerance is high. The introduction of machinery and particularly the pneumatic drill created so much disease that the problem became serious to management. In periods of labor shortage, like that following the Boer War in South Africa, it precipitated a crisis. Such situations, together with the general awakening of social consciousness during the past 40 years, led to a demand for remedial measures. It resulted in an intensive study of the incidence and cause of "miner's consumption."

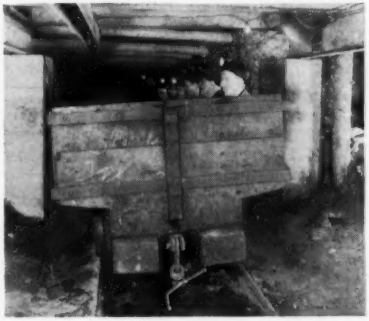
As a consequence of this study it is now accepted that all dusts are not equally dangerous, that free silica, usually as quartz or flint, is the preeminent cause of pulmonary disease, that, while free silica produces severe reactions in the lungs, silicosis itself does not kill its victims and may not

even disable them and, finally, that silicosis is particularly dangerous because it specifically predisposes its victims to tuberculous infection. In recent years certain American writers have questioned the latter generalization because the manifestations of tuberculosis in the silicotic subject may be different from those in an otherwise normal one. Their challenge, however, has not shaken the faith of those best acquainted with the condition.

Further research is defining the conditions under which free silica produces its harmful effects upon the lungs. It has been proven that while particles as large as 10μ in diameter may be suspended in the atmosphere and inhaled into the lungs, only those 3μ and less in diameter cause much damage to tissues. Experiment has proved that in general as the particle size decreases the *rate* of tissue reaction increases, indicating a relationship to the amount of mineral surface in contact with the body fluids.

It has been shown that the concentration of silica in the air must exceed certain undefined limits before disease will develop in a working life-time. Tentatively the maximum permissible limit has been set at 5 million particles per cubic foot of air, but this standard may not be applicable to all exposures and may have to be revised as experience accumulates.

It is recognized that exposures have to be continued for years before evidence of silicosis becomes manifest. The rate of tissue reaction is modified by the concentration and size of the silica particles and by the character of the other minerals associated with it in the atmospheric dust. Under extraordinary conditions producing excessive concentrations of very fine and very pure silica dust, disease may develop within a two year period but it then appears with unusual anatomic manifestations. In ordinary mining operations in the past it never appeared in less than three or four years and now exposures of nine, ten or twenty years are more commonly reported.



Second, as a potential dust hazard creator, is the operation of mine railroads. As such, they bear careful scrutiny in any program to reduce pulmonary hazards.

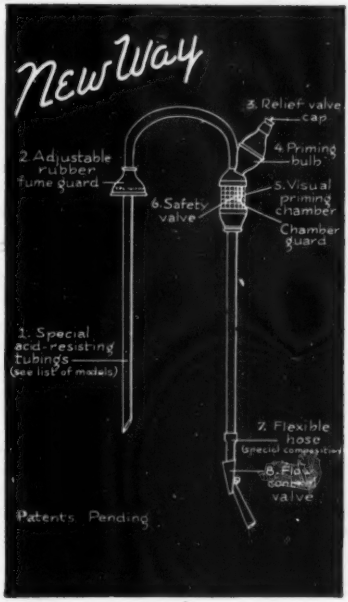
Experience is demonstrating that the clinical picture of silicotic subjects in different industries is not always identical. As a general rule men with uncomplicated silicosis of the discrete nodular type are not disabled and exhibit no serious symptoms. There may be exceptions in types of disease produced by certain combinations of free silica and other minerals. Infection of any origin makes silicosis serious and tuberculosis is particularly hazardous. The problem today is one of putting in practice the well tried procedures for combatting tuberculosis.

[*Continued on page 31*]

A New and Safer Way to Handle Chemicals!

T.P.C. SAFETY SIPHON

DISCHARGES CARBOYS BY THE VACUUM METHOD



- Discharges from a trickle to 6 gallons per minute
- Free, smooth flow
- No spilling, splashing
- Less fume concentration
- Utilizes vacuum principle
- Eliminates pressure method condemned by the M.C.A.
- No manual tilting
- Easy to operate
- Made for every acid
- Sturdily built; inexpensive

Put a T.P.C. Safety Siphon on test. State needs when ordering. Write for literature and prices. Also ask for leaflet "Safe Handling of Acids and Chemicals" describing many other safety products.

PULMOSAN
SAFETY EQUIPMENT CORP.
Dept. OH, 176 Johnson St., Brooklyn, N.Y.

New Products

LIFT TRUCKS

Three new safety trucks for power handling of industrial materials have been brought out by the Elwell-Parker Electric Company. Fig. gep-6 illustrates the lift platform truck for handling material on

skids, which has a speed of 10 m.p.h., has a capacity of 6,000 pounds, and operates by a four cylinder motor. Fig. f-15 is the center control fork truck, and may be powered by battery or gas-electric unit. (illustration)

GOGGLES

The American Optical Company announces that in the future all their Ful-Vue Safety Goggles will be equipped with a new type nose-piece, and in a new range of three eye and three nosepiece sizes. Feature of the new products is the soldering in four places, instead of the conventional two, thereby giving greater strength and rigidity.

ALARM

Connectabell is the name of a new type alarm and signal bell with an Alnico-magnet motor which permits plugging in at any socket like any electrical appliance. Sizes range from 4 to 16 inches, for either A.C. or D.C. or low voltage currents. The new bell is intended for all manner of signal and alarm situations.

LIGHTING FIXTURES

Lighting fixtures for use in hazardous locations, and which are approved by Underwriters' Laboratories for use in the presence of combustible dust, have been announced

Dust-Proof Fixtures

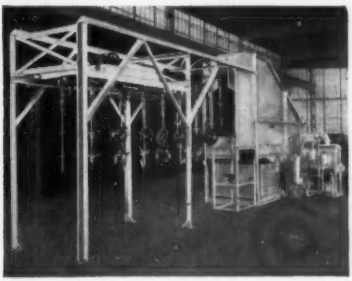
by Goodrich. The new fixture is dust-proof, moisture-proof, and weather-proof. (illustration)

Additional information and descriptive literature on any of the products mentioned in this service department may be obtained by writing ***Dept. N,*** OCCUPATIONAL HAZARDS & SAFETY, *812 Huron Road, Cleveland, Ohio.*

IN THE FIELD

DEGREASER

Because of the often injurious effect of certain oils and greases on workers' skin,

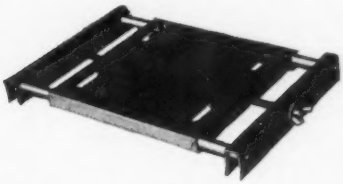


especially in combination with metal fragments, the degreasing operation of metal parts is best handled automatically in high-production industries. The Detroit Rex Products Company announces a new line of degreasers designed to do this job. The new equipment is in several sizes to fit various requirements, and is a completely self-contained unit. (illustration)

Statements made in connection with any product mentioned in this service department are based on manufacturers' claims. Although these claims are believed to be true, this magazine does not guarantee that to be the case.

SAFETY MOTOR BASE

Designed to provide constant belt-tautness, the new safety motor base developed by the Ideal Commutator Dresser Co. operates on the principal of spring tension.



The device is simple and compact, and should do much to eliminate the hazard of belts slipping off pulleys.

THREE FACE SHIELDS IN ONE

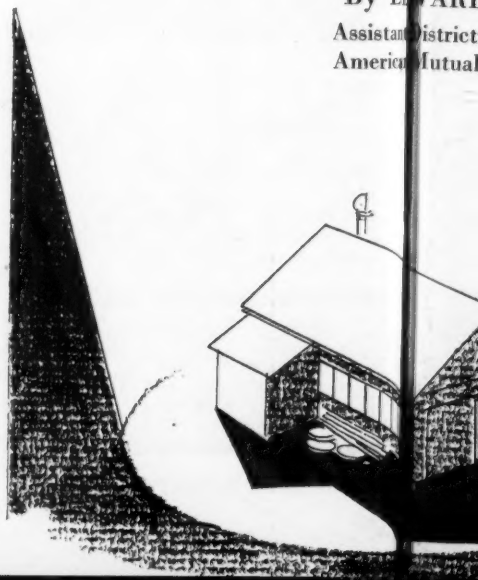
This face shield announced by The Boyer-Campbell Co., Detroit, is three types in one. It has been made practical with a complete interchangeability of parts and the screen, fibre or "plastacele" guard may be quickly buttoned on at the option of the wearer.

Fitted with plastacele window, it is ideal for spot, flash and gun welding, buffing, polishing, wire brushing, die casting flying scale, etc. . . . when fitted with Wire-Screen window, it is recommended for use for babbitting, heat protection, etc. . . . the Fibre front and Glass holder give the wearer complete protection for acetylene welding, burning, scarfing, etc.

Turning the Spot

Small Plant

By E[illegible]VARI
Assistant District
American Mutual



WHILE it has been customary in safety circles to speak of the small plant as one which carries not more than one hundred (100) employees on the payroll, I believe the term "small plant" is a relative term.

Small plants have a safety problem, and this problem is acute, is unique, and important.

My experience shows that the small plant accident control problem is unique by reason of the plant being small, or else I have found that the answer is the same as for the large plant. If the latter were true, in all instances, the proven accident control answer for large plants would produce results in the small plant. However, it has not, for the general opinion is that small plants do not respond to large plant safety programs. My study over many years has been a review of not only accident statistics, but also a painstaking scrutiny of many small plants themselves. This study has included a search into the business organization, their manufacturing and service activities, their outlook towards industrial safety, and the many conditions which have resulted in both accidents and accident prevention recommendations. I have observed both successful applications of accident control plans and also failures. In scores of instances safety programs have been adopted and many of these were designed for the individual plants in accordance with the needs.

Many of these plants have more than one department, and each depart-

Spotlight on the Small Plant

By EDWARD C. JACOBS
Assistant District Engineering Mgr.
American Mutual Liability Ins. Co.

ment has a foreman running it. In many respects these plants do not differ in organization details, or otherwise, from large plant production characteristics.

I think it should be obvious to all of us that dangers are related to industry and not present only in the large plant. I have personally visited hundreds of small plants and thousands of accident reports from small plants pass over my desk each year. I know the small plant does have an accident problem. I have studied the small plant accident situation specifically, and analyzed the conditions for their specific and direct bearing upon accident cause and accident control. I have found that the unguarded saw can, and does, "bite" in the small plant as it does in the large plant. I have found that ignorance of existing hazards on the part of employees will be direct cause of injury in any plant regardless of the size. As a matter of fact, the machine shop, foundry, textile mill, cannery, woodworking shop, etc. may be small in square footage and have very few employees on the payroll, but, relatively, may be expected to include every inherent danger that exists in what we would call the large plant.

Proceeding on the basis that every small plant has a hazard problem. I feel that control *is* practical, even for the small concerns with limited working capital.

Organization

Let us first look at the accident control question by observing how

small plants are organized. Figuratively speaking, a small plant is a "one man" concern. By that I mean that the owner, or the manager in the owner's absence, is the whole management of the enterprise from top to bottom. The executive head of a large concern operates horizontally; his mind encompasses the aim and purpose of the enterprise of which he is the head and directs the operating policy. In the day-to-day conductive affairs he hasn't time to dig deep in every last detail of activity; he cannot afford to waste time to find the error in a trial balance sheet. In sharp contrast to this is small plant management. The full breadth and scope of the enterprise is within the one man's operating zone, and the full depth of his activity is not plumbed until you follow him around and see him caliper a shaft being turned in a lathe, see him grind a casting, see him lean over the bookkeeper's desk to help locate a mistake, see him scrutinize orders and watch him employ new help. He is everything. It is the verticle operation of this man which delineates his "one man" plant.

Whether the concern engages one or three hundred employees is unimportant. More often than not, the manager is also a workman. The need has never been demonstrated for installing a superintendent or foreman with specific responsibilities in the same sense that superintendents and foremen carry a direct supervisory authority over the operating details in large concerns. The transition from the small to the large plant takes when the management has broadened beyond its ability of time and strength to remain full depth in the concern's activities and found it necessary to establish a group whose individual responsibilities are separate from each other and different in their scope. So long as it is managed vertically by one man, it remains a small plant. The accident control answer must fit this condition or correct the faults in it.

Practically all industries were included in gathering the material presented in this article. They include the following:

Cotton Underwear	Tile & Stone Work
Bookbinding	Paper Boxes
Gloves	Valve Mfg.
Machine Shops	Clothing
Electrotyping	Glass Mechanics
Sheet Metal Shops	Brushes & Brooms
Furniture	Laundries
Lenses	Boots & Shoes
Foundries	Bottling
Paint	Bakeries
Silk Mills	Automobile Body
Box Mfg.	Blacksmiths
Elevator Erection & Repair	Pocketbooks
Pillow Making	Pattern Making

Equipment Factor

Management contributions start with the physical plant and its adequacy to accomplish its purpose. If the equipment is insufficient in amount or inadequate in size and strength to manufacture the goods, or perform the service, it is inevitable that accidents will occur. This is often illustrated in the small plant by the frequent necessity for purchasing second hand equipment which may be the best available in the market within the price range and size range which can be afforded, but be inadequate and perhaps unsafe. Very often the machinery itself may be adequate

for production, but be willfully short on safeguards to prevent accidental contact with dangerous moving parts. Until recently, equipment was not available fully safeguarded, guards having to be added to the machinery after installation. The largest group of accident control needs in small plants is the safeguarding of dangerous parts of machines, either in transmission of power, dangerous moving parts, or the point of operation. In many plants one-fourth to one-fifth of the accidents are attributed to mechanical equipment.

Labor Factor

One of the groups having direct responsibility for accident cause in the small plant is labor itself. The most that can be said about the employees' responsibility is that they are expected to do the best they can under the circumstances, do the best they know how with the equipment furnished, with the instructions which they have received, and the amount of skill which they possess in the job for which they were hired. If small plants embrace a wide field of manufacturing, so do they embrace a wide field of quality of labor. Small plants do not have a corner on the best quality of labor, neither are small plant employees made up of poor quality, unqualified and stupid employees.

Even more responsibility rests upon the individual workman in the small plant than in the large plant, because he is, to a large extent, his own "safety supervisor." Most small plants cannot have a full-time safety engineer or other supervisory official to plan and carry out safety measures. Of course, the foreman, the manager, or the owner must provide safety education and discipline in the use of safety devices provided by the management. But, due to the lack of departmentalization, close enforcement of safety discipline is difficult. Once a workman is told what to do, and provided with safety devices, he must realize his responsibility from there on.

[To be continued]

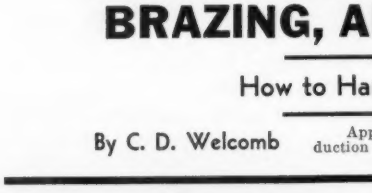
Whether the plant has 50 or 5000 employees, the hazard problem in special operations is as great for all employees.

Compressed gas cylinders are safe for the purpose for which they are intended. Serious accidents connected with their use can almost invariably be traced to abuse or mishandling.

Safe Handling of COMBUSTIBLE GASES Used in WELDING BRAZING, AND CUTTING

How to Handle Cylinders

By C. D. Welcomb — Applied Engineering Department, Air Reduction Sales Company.



The extension of the use of flame cutting, flame hardening, and flame surfacing methods in industry greatly increases the necessity for knowledge of safe handling of the gases involved.

CERTAIN dangers and hazards are inherent or incidental to every trade, industry, profession and pleasure. A paper-hanger breaks his neck falling from a stepladder, a carpenter cuts off a finger with a hatchet, a machinist skins his knuckles when a wrench slips, and dies of blood poisoning because of neglecting the wound, and so on through every activity of life.

It is difficult, if not impossible, to separate the inherent hazards from the incidental ones. The paper-hanger might fall from a step-ladder while trimming a tree in his backyard with like result. The carpenter's accident is a result, but not a common one, of using an edged tool necessary for his trade. Many machinists skin knuckles with no serious after-result. The hazard lay in neglecting the injury, poor health and infection. regulators, hose, or other appliances Many accidents are a result of carelessness, and disregard of the fundamental principles of safe conduct.

So, when we talk about certain dangers and hazards in oxy-acetylene welding and cutting, we shall discuss some matters not broadly exceptional in the main, and some peculiar chiefly to the apparatus and gases used.

Never drop cylinders nor permit them to be struck violently. Never use a lifting magnet nor a sling (rope or chain) when handling cylinders. If a crane is used a safe cradle or platform must be provided to hold the cylinders. Never attempt to mix gases in a cylinder. All cylinders should be protected against excessive rise in temperature. Cylinders may be stored in the open, but in such cases should be protected against extremes of weather. During

winter, cylinders stored in the open should be protected against accumulations of ice and snow. In summer, cylinders stored in the open should be screened against continuous direct rays of the sun. Do not place cylinders near furnace, open flames, radiators, nor store them where sparks can fall upon them, or in workrooms. Never store cylinders near highly inflammable substances, such as oil, gasoline, waste, or other combustible materials. Store all compressed gas cylinders in a well ventilated place. Do not store acetylene and oxygen cylinders in the same compartment. There should be a fire-resisting partition between stocks of oxygen and acetylene cylinders, whether full or empty.

Always refer to oxygen by its full name, "Oxygen," and not, for example, by the word "Air." Oxygen, the life-supporting part of the air, is the active element in combustion. When commercially pure, it is capable of producing combustion effects never experienced with air alone. Commercial considerations require that oxygen be highly compressed in the cylinder to deliver a worthwhile volume. Even with a pressure of 2000 pounds per square inch, a steel cylinder made of high quality steel, brings to you only 220 cubic feet of oxygen. It is obvious then, that cylinders filled with the gas that actively supports combustion and under 2000 pounds pressure should be handled carefully.

Oxygen cylinders should never be handled on the same platform with oil or placed in a position where oil or grease from shafting or other overhead structures is likely to fall upon them. Never permit oil or other readily oxidizable substances to come in contact with oxygen cylinders, valves, regulators, gauges, and fittings. Do not handle oxygen cylinders or apparatus with oily hands or gloves. Never interchange oxygen regulators, hose, or other appliances with similar equipment intended for use with other gases. Necessarily certain combustible materials are used in the pressure regulators and the hose. Rubber hose, though it burns slowly in air, burns rapidly, or with explosive violence in oxygen

MILBURN SCORES AGAIN!

Announcing PLY #8

Welder's Cream . . . for prevention of arc Burns

A vanishing type cream that rubs into the skin. Has the ability to block the Ultra Violet and Infra-red Rays from welders' operations, especially in heavy welding.

Recommended for areas of exposed skin surfaces subject to welding burns where serious secondary degree burns may be experienced.

Water soluble for washing-up purposes. Available in six-ounce jars, packed twelve to a carton.

DISTRIBUTORS IN ALL PRINCIPAL INDUSTRIAL AREAS

MILBURN CO., Detroit, Mich.

or when filled with oxygen. Hence, the care that must be taken to prevent fire starting in oxygen regulators and hose.

Never use oxygen as a substitute for compressed air. It is dangerous to use oxygen for pneumatic tools, to start Diesel engines, for composing pressure in oil reservoirs, for paint spraying, and for blowing out pipe lines.

Call acetylene by its full name "Acetylene," and not by the word "Gas." Acetylene is far different from city gas or furnace gas. Acetylene supplied in cylinders is under initial pressure of about 250 pounds per square inch. The steel cylinder is closely packed with a porous material, and the filler is soaked with acetone. The acetylene is dissolved in the acetone to 25 times its own volume. The combination of a porous filler and acetone is what makes it commercially feasible to deliver to you about 270 cubic feet of dissolved acetylene under pressure of only 250 pounds per square inch. The cylinder weighs about 180 pounds empty and about 199 pounds filled. The packing provides for safe transport of a gas that cannot be safely compressed in the free state to more than 15 pounds per square inch. In the dissolved state, however, it is safely compressed to 250 pounds, but right here is a place to emphasize the care to be taken in handling acetylene cylinders. If roughly handled, dented or allowed to fall, the porous filler may be displaced or jammed together so as to create a void in which free acetylene collects. This sets up a more or less dangerous condition. Acetylene cylinders should be used and stored in an upright position, when practicable.

Photo courtesy The Linde Air Products Co.

A typical gear flame hardening operation which depends on a large volume of oxygen and acetylene. New increased uses of this kind created new management problems for the safe handling of such equipment.

Keep sparks, flame and heat away from acetylene cylinders. Never use acetylene from cylinders without reducing the pressure through a suitable regulator attached to the cylinder valve. Turn the acetylene cylinder so that its valve outlet will point away from the oxygen cylinder. Do not open the cylinder valve more than one full turn. Never interchange acetylene regulators, hose or other appliances with similar equipment intended for use with oxygen. Never attempt to transfer acetylene from one cylinder to another nor to refill an acetylene cylinder, nor to mix other gas, or gases, in an acetylene cylinder. The wrench used for opening the cylinder valve should always be kept on the valve stem when acetylene is being drawn from the cylinder. Do not pile the hose on top of an acetylene cylinder, or anything which will interfere with quick closing of the valve.

Never test for acetylene leaks with an open flame. Use soapy water. Should a leak occur in a cylinder, take the cylinder into the open air, keeping it well away from fires or open lights.

The N.F.P.A. Regulations provide that not more than 2000 cubic feet of acetylene shall be stored in a building, unless the storage space meets certain specific requirements.

Other combustible gases should be treated in much the same manner as oxygen and acetylene.

Keep handy a burlap bag wetted with calcium chloride. Should a cylinder catch fire, this bag promptly thrown over the flame will usually smother it. If a solution of calcium chloride is used, the bag will always be damp and will not burn. An asbestos blanket is preferable, in which case it is not necessary to wet the blanket with calcium chloride. Unless the blaze is of small size and can be quickly extinguished by means of the

Many small plants have designed practical (but unapproved) methods for transportation of compressed gas cylinders.

calcium chloride burlap or other readily available means, get away from the cylinder and, if practicable, play a stream of water on cylinder to keep it cool.

Each gas should be regulated through suitable regulators specially designed to withstand the cylinder pressure, and capable of reducing the greatest pressure to the working pressure. You can regulate pressure in a steam radiator by "cracking" the radiator valve when you do not need the full pressure. The steam condenses in the radiator as fast as it enters, and the pressure remains fairly constant. But if you undertake to regulate the pressure in an air tank without an outlet, in the same manner by opening a connecting air

[*Continued on page 40*]

Type B
PATENTED

When desired with fireproof cap, as shown, add 35 cents to quoted price.

JACKSON
Eyeshields

This wide visioned, non-fogging shield with its standard 2 x 4¼" lens is particularly desirable for blow torch work, gas cutting and welding. Lens frame is of non-inflammable Bakelite—side protectors of opaque, fire-resisting fibre. Multiple adjustment provides a snug and comfortable fit to any head. Lens can be set at any angle.

Price, complete with lens (shades 3 to 6), $3.75. If your dealer can't supply you, order from this advertisement.
Write for Jackson Eyeshield folder that describes this and fourteen other types.

JACKSON ELECTRODE HOLDER CO.
15122 Mack Ave. Dept. O-1 Detroit, Mich.

Industrial DUST CONTROL

By Roy P. Warren, Research Engineer
Buffalo Forge Co.
Buffalo, N.Y.

PART IV. EQUIPMENT USED IN INDUSTRIAL DUST CONTROL

THIS is the fourth in a series of articles by M. Warren. This month he discusses various aspects of dust control equipment.

Economic Operation of Equipment

This field has been neglected a great deal but fortunately several recent successful installations have pointed the way to increased efforts. The one which we now will consider is not to the writer's knowledge written up but is decorated from memory.

In 1936 a nearby telephone company mechanized one of its substations with the result that theoretically only one employee was required in constant attendance. After this station had operated a few months, failures and breakdowns in service caused not only great concern on the management's part, but also a substantial sum of money in increased repairs and maintenance.

Control

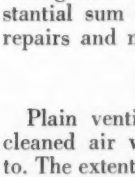
Plain ventilation plus the use of cleaned air was eventually resorted to. The extent of this work was to put the entire building under about 1/4" positive pressure and supply air which had a dust count of about 800,000 particles per cubic foot which averaged 5-10 microns maximum size.

Failing of equipment, breaks in contact and the like, ceased almost completely, thus eliminating the difficulty. Happily enough the savings thus obtained amortized over a few years more than paid for the installation. These results can be obtained by either the wet or dry cleaning of air and properly designated air supply systems.

There are many similar cases which will probably be publicized soon: however, it should be borne in mind that the greatest source of supply of these problems will be the careful intelligent search for them by trained observers.

Nuisance Elimination

Probably elimination of fly ash from a boiler plant will serve to illustrate this type of dust control. Statistics claim that in a heavy in-



dustrial area some 1500 tons of dust will be deposited per year per square mile. Thus, it may be seen that control of this dust could be rather important if an industry in this classification were located near offices, homes or the like.

Figure No. 1 shows the action of dust leaving a stack 200 feet high.

It is not very important to remove a high percentage of dust under 20 microns in size, as such particles will be air borne and may stay in suspension for 40 or 50 miles, or, in any event, as much as the prevailing wind will pick up and carry in normal circulation.

Collection and Disposal

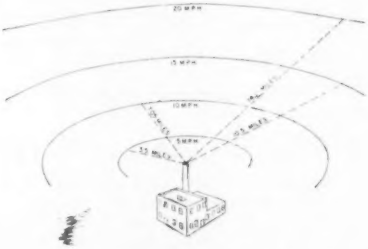
These less rigid requirements on dust control are generally accomplished by the use of electric precipitation cinder fans, cyclones, or multicyclones, and in some cases spray or wet systems.

A wide variation in collecting efficiencies is claimed and in many cases satisfactorily results are obtained, but there still remains much research in this field to solve this problem in a practical way. This type of control varies from most others in that the collecting unit can be a part of the fan or otherwise located in the stack, thereby eliminating the collecting and conveying angles.

Collection and Conveying

Luckily the science of air movement has more than kept pace with the science of disposing of the entrained dust in the air. In general it may be said that a dust control system is as good as the manner in which dust is collected or prevented from getting into the atmosphere.

In Bulletin No. 217 published by the United States Bureau of Public Health, Dallavalle proceeds at some length to discuss the effectiveness of hoods. These principles are fundamental essential information in the attack on almost any dust problem.



They, in many instances, only act as a starting point and the actual control is obtained by some enclosure which combines many different kinds of hoods, such as a hood at a bagging station in a feed mill which applies the principles of up draft, down draft and side pull.

TABLE

Method	Type	Efficiency
1. Gravity settling or separation.	Wet or dry	50% ±
2. Cyclonic separation.	Wet or dry	50-80%
3. Static washing.	Wet	70-95%
4. Dry filtration.	Dry	95% plus
5. Scrubbing and dynamic precipitation.	Wet or dry	95% plus
6. Electrostatic precipitation.	Dry	90% plus (by blackness test)

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2 *Reduce* PLANT MAINTENANCE

Prevents discoloration and corrosion of painted surfaces and steel work. Brightens walls — postpones repainting.

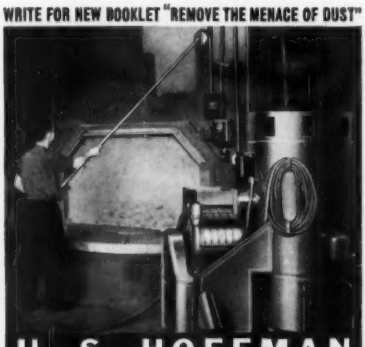
3 *Prevent* DAMAGE TO PRODUCT

Dust particles filtering down from overhead frequently cause costly damage to products in process of manufacture.

4 *Protect* WORKERS' HEALTH

Protect health of workers. Breathing dust-laden air is a serious health hazard. Hoffman equipment provides safe working conditions.

WRITE FOR NEW BOOKLET "REMOVE THE MENACE OF DUST"



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Air Appliance Division

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Careful study of this document is recommended for anyone who tackles dust problems.

The minimum practical duct velocity in the control of entrained dust will, of course, cost less in annual power bills. This limit is that velocity which will maintain a clean duct under the worst operating conditions. In the case of fume control, naturally lower velocities may be used satisfactorily.

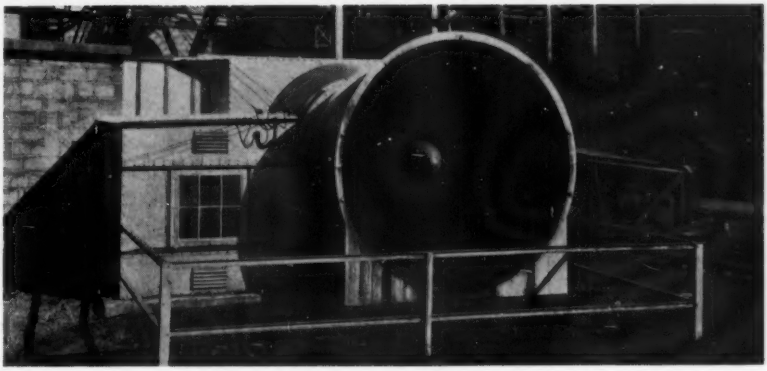
It might be timely at this point to offer a word of caution to the engineer attacking this problem. That is to watch his step in interpreting test room results, especially on small size apparatus. Unfortunately, better results can be obtained on test room apparatus relative to collection, conveying, and disposal than can be anticipated under actual field conditions.

Disposal of Collected Dust

Here the purchaser will probably be somewhat bewildered by the many solutions to his problem. There are six major ways in which to dispose of collected dust shown in Table I.

These are listed so that No. 1 is the lowest and No. 6 the highest in percentage of efficiency. The range of efficiency listed is approximate only and there may be many cases which lie outside of these limits.

There are approximately twenty companies engaged in the manufacture of one or more pieces of this equipment and these companies invariably are prepared to engineer the job rather than have their equipment be installed either where it is not necessary or where it would be required to perform its normal capacity.



The need for elimination of fumes in mining operations has lead to the development of highly engineered apparatus.

Mining Hazards

(Continued from page 16)

Today prevention remains the only reliable means of combatting silicosis. Water, ventilation and respirators are used to prevent dust from forming and reaching the lungs of miners. The physician's part in prevention is equally important. His findings in the lungs of exposed workmen are proof of a hazard. He can select individuals free from infection and otherwise capable of withstanding exposures to dust. He must detect evidence of complicating infection and determine whether disability exists. He must decide where men with different degrees of pulmonary involvement should work.

New methods of control are under investigation, but they are still in an experimental stage. The discovery that other minerals associated with quartz in atmospheric dust will modify its action has led to detailed study of their influence.

While enough knowledge has now accumulated to control silicosis in many industries, there are still essential details that are lacking. Opinions differ as to the mechanisms by which silica irritates the tissues, although many believe that its solubility is responsible. The question of individual susceptibility remains an enigma although its solution is of utmost practical significance.

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Safety-Steel-Toe Shoes for Job and Street Wear
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Right off the Docket

The trend of litigation on workmen's health and accident compensation is reflected in these briefs of the latest and most representative cases coming to trial in the intervals between issues. Familiarity with this trend is important to every industrialist.

Violent Deaths Held Within Scope of Employment

The proprietor of a butcher shop which was located in a tough neighborhood, saw a large crowd approaching his store. Fearing that his windows might be broken, he instructed his helper to go out and keep the crowd away. The helper did so, and found the crowd was chasing a suspected thief. He joined in the chase and after going a few hundred feet he forged to the head of the pursuing crowd. The suspect turned, shot, and killed the helper. The Court stated that the death occurred in the course of employment; that the chasing of the suspect for a few hundred feet did not constitute an abandonment of employment; that there should be an award.

Weitz vs. Weitz (Pennsylvania) 7 A. 2nd 83 (June-1939)

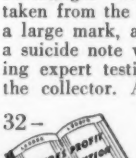
In another case, a collector was subpoenaed to appear in Court and testify against one who had tried to rob him. The attempted robbery had occurred while the collector was in the performance of his duties. The collector informed his superior of the subpoena and was told to appear in court. The following day the collector's empty car was found on a bridge spanning the Allegheny River in Pittsburgh. Subsequently, his body was taken from the river. On his forehead was a large mark, as from a blow. In his car, a suicide note was found, but a handwriting expert testified it was not written by the collector. A witness testified he had seen a man get out of a car and look over the edge of the bridge; that later he had seen a man swimming some two hundred feet down the river.

The Court rejected the defense that the death was the result of suicide, and therefore no award should be made. It said that the facts showed an accidental death whether the collector had fallen in the river, or had been thrown in, and consequently the deceased's dependents were entitled to compensation.

Hunter vs. American Oil Co. (Pennsylvania) 7 A. 2nd 479 (July)

Head Injury Results in Pneumonia W.P.A. Worker Granted Compensation

The husband of the plaintiff was working as a bricklayer in the City of Lincoln, repairing a storm sewer. He was struck on the head by a brick. He went to the hospital and a small cut in his head was treated. Thereafter, he worked intermittently for about a week, experiencing headaches and dizziness. He collapsed one morning, was taken to the hospital where he was found to be suffering from lobar pneumonia. A week later he died. It was found that the blow to his head had caused a concussion, lowering his resistance to infection, and thereby being a cause of the lobar pnuemonia, which was held to be a disease or infection naturally resulting from violence to the physical structure of the body. An award was made.



Another phase of the case which concerned the court was the fact that the project upon which the plaintiff's husband was working was being paid for out of Federal Relief Funds. The City of Lincoln contended that since it did not fix nor pay the wages of relief workers, there was no relation of employer and employee, and such workers should not be entitled to compensation from the State Fund. The Supreme Court of Nebraska held otherwise, and affirmed an award, stating; "Simply because the wages of a public employee are paid from Federal funds does not negative his being the employee of the city, which had entire charge of directing and controlling his work. Under the more liberal provisions of the Compensation Act affecting public employees, it is immaterial that the city did not fix the wages of such employee. If the city has the power to accept or reject the services of a public employee, this, under the circumstances in this case, established the relation of employee and employer."

Hendershot vs. City of Lincoln (Nebraska) 286 N.W. 909 (July-1939)

Welding Tank Without Taking Precautions to Avoid Explosion Held Not Such Negligence as Will Preclude Recovery

The employer in this case contends there should be no award because the employee was wilfully negligent. The employee was welding a leak in a 500 gallon molasses tank with an oxo-acetylene torch. He had not cleaned the tank, nor had he removed the cap from the tank. The tank exploded, killing the worker.

There was conflicting expert testimony as to safety of welding in the manner in in which the worker in this case had proceeded. One expert testified that any welder would know that it was unsafe. Another stated that it was not dangerous. The Court sustained an award, holding that to preclude a recovery the showing of mere negligence is not sufficient, but such conduct must be shown on the part of the workman as manifests a reckless disregard of consequences coupled with a consciousness that injury will naturally or probably result. The Court said, that the employer's evidence was insufficient to prove the worker was wilfully negligent.

Richard vs. Abts (Nebraska) 287 N.W. 199 (July-1939)

Tuberculosis Induced by Silicosis Found to Be Compensable under Occupational Disease Statute

The worker was employed as a carpenter in the employer's plant. He worked near a spraying booth where automobile bodies were sprayed with paint by means of pressure guns. The inhalation of the spray dust which contained silica made active a latent tubercular condition and the worker died from the resulting tuberculosis.

The Court stated that an occupational disease is not one which is peculiar or incident to an employee's work, but rather, a disease caused by or directly resulting from working conditions. Holding that the Workmen's Compensation Act must be liberally construed, and doubt respecting right to the compensation resolved in employee's favor, the Court sustained and award for the death in this case.

Fitzgerald vs. Fisher Body St. Louis Co., et al. (Missouri) 130 S.W. 2nd 975 (July-1939)

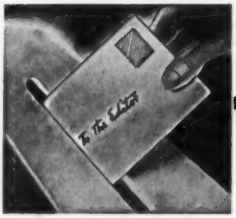
Award for Cerebral Hemorrhage Brought on by Mental Strain Reversed

In the April, 1939, issue of OCCUPATIONAL HAZARDS & SAFETY, a case was reported wherein an award was made for death resulting from a cerebral hemorrhage caused by mental strain. The Court stated that strain, whether mental or physical, if it results in injury, should be compensable.

On appeal to the Supreme Court of Pennsylvania the decision was reversed and an award refused. The Court stated that the evidence did not justify a finding that overexertion, either mental or physical, caused the death. Two judges dissented and were in favor of sustaining the award.

Monahan vs. Seed & Durham et al. (Pennsylvania) 6 A. 2nd 889 (June-1939)

Questions and Answers



Individual answers are given to all questions on industrial health or accident matters. A few of the questions received from readers each month are published for their general interest.

Q. What is the effect of phenol and formaldehyde in the manufacture of our plastic products? C. H. Chicago.

A. Formaldehyde, is made from methyl alcohol and a commercial variety may contain as much as 15 per cent of unchanged methyl alcohol. It combines with the proteins of the body cells to form irreversible compounds. Some authorities say that its effect is local only; even when there is severe irritation of the air passages there is little evidence of absorption. Commercial formaldehyde is only 35 per cent pure. There is a question whether the physiological action is traceable to the decomposition of formaldehyde into formic acid and methyl alcohol.

The most conspicuous effect of formaldehyde in industrial use is on the skin, eyelids, conjunctiva, and sometimes the cornea. Individuals vary much in their susceptibility to it, and in some cases a hypersensitivity develops. As alway- blonds seem to be more severely affected than brunettes. The affection is usually described as a moist eczema, but there may be ulcers. Conjunctivitis is a common complaint; keratitis is rarer.

Formaldehyde is mentioned several times in recent medical literature dealing with industrial poisoning, which was to be expected in view of the great increase in the use of plastics in recent years. Formaldehyde is used not only in the preparation of bakelite (from commercial phenol and formaldehyde), but also in producing the newer plastics which have casein as a basis or urea derivatives.

There is a difference of opinion among practical men as to whether bakelite itself is a skin irritant. The trouble seems to come from the solvent used in making objects from ground bakelite or in making bakelite varnish, such solvents as phenol, turpentine, methyl alcohol, but especially formaldehyde or hexamethylenetetramine, or both.

A number of cases have been found of weeping eczema in men working with a mixture of bakelite, varnish, turpentine, wood oil, and benzene, and tests ran down the varnish as the cause. They believed that phenol in the varnish was probably the real agent, for the victims of eczema were all hypersensitive to phenol.

Q. "What is the effect of sulphate of iron on the human organs and heart?" T. M. Pittsburgh.

Iron sulphate is a translucent, greenish crystalline substance known also as green vitriol. Although not a powerful irritant, this has proved fatal when taken in a large dose. It is sometimes given to procure abortion. Ferrous sulfate is a powerful astringent. Applied to the oozing impetiginous lesions, the iron attached itself to the superficial connective tissue of the dermis. Ferrous valence was soon oxidized to ferric. Pigmentation due to iron, has been recorded by an investigator*, who observed permanent punctate staining of the skin following the application of ferrous sulfate.

* *References:* Pusey, W. A.: Brown Stains in the Skin From Wet Dressings of a Solution of Copper as. J.A.M.A. 68: 627 (Feb. 24) 1917.

Traub, E. F., and Tennen, J. S.: Permanent Pigmentation Following Application of Iron Salts for the Treatment of Ivy Poisoning, J.A.M.A. 106: 1711 May 16. 1936.

A Critical Review of Occupational Disease Legislation

By THEODORE C. WATERS
Attorney at Law
Baltimore, Maryland

MANY occupational disease compensation laws are of recent enactment and, in the course of their administration, defects have developed that have necessitated amendments. These laws are not uniform; they have been designed to meet the industrial conditions in the particular states to which they apply.

There is an important distinction between accidental injuries and occupational disease injuries. Accidents occur at specific times and may be readily discovered, and usually there is no question as to the particular employer in whose employment the accident occurred. On the other hand, occupational diseases may be slow of development, unknown to the employer and employee until disability occurs. They may be incurred while the employee is working for one of several employers.

The occupational disease compensation laws that are now effective in the various States are not uniform, but there are certain basic principles underlying them which are common to all. We must recognize that the issues are controversial and give rise to serious disagreement among the parties affected.

Schedule of Compensable Diseases or General Coverage

In drafting legislation, consideration must be given to the scope of the law. The law, using the "schedule" plan, may provide compensation for certain named diseases or, using the "general coverage" plan, may provide compensation for any and all occupational diseases.

The principal advantages of the schedule system are:

1. It is definite and limits the compensable diseases to those named in the law, describing the processes wherein the hazards exist.
2. It avoids the necessity of judicial interpretation of the scope of the law.
3. It defines specific hazards and better enables employers to perfect protection against them.
4. It reduces the cost of insurance.

The advantage of the general coverage law is that it makes compensable all occupational diseases, if we know what we mean when we use the term "occupational disease." Some laws attempt to define this term, but after careful study, I have yet to find a definition that is satisfactory. Other laws do not define the term which is, therefore, left to judicial interpretation. The scope of the law is thus left to administrative and judicial interpretation. I agree that the laws should be so interpreted but, under the general coverage method, it is possible that compensation may be sought for

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every human ill to which an employee may be subject.

The diagnosis of occupational diseases and the evaluation of the resulting disability have been so difficult and the cause of so much dispute that most of the state laws make provisions for medical boards to assist the administrative agency in its determination of the medical questions involved in claims.

Common law litigation to decide occupational disease claims has failed because of the technicalities, delays and expense of procedure, which, in some instances, amounts to no less than actual legal and medical racketeering. Compensation procedure should be as simple, direct, and inexpensive as possible. The most humble claimant is entitled to have his case heard without the necessity of engaging professional witnesses on his behalf.

Bureaus of Industrial Hygiene

The prevention and control of occupational disease injuries is and should be the goal of everyone interested in the subject of industrial hygiene. Economically, *prevention is preferable to compensation.* Employees are more concerned about the maintenance of their health than in compensation for injuries to that health, while to employers prevention will prove to be but a small portion of the cost of compensation.

Special Legislative Provisions for Pneumoconioses

Of all the occupational diseases that have perplexed employers and legislative committees that have studied the form of laws providing compensation, the pneumoconioses have presented the most difficult problems.

The term "Pneumoconiosis," of Greek origin, implies a condition of the lungs arising from the inhalation of excessive quantities of dust. It is probably the oldest source of industrial hazard and has been a matter of concern to manufacturers for the past several centuries.

The two most dangerous dust diseases are silicosis, caused by the inhalation of silican dust, and asbestosis, caused by the inhalation of asbestos dust, a magnesium silicate. It is with respect to the disability of employees resulting from silicosis that the most difficult legislative problems are presented. Legislative provisions are necessary in order to avoid the imposition upon industry of unjust compensation costs and to award proper and just compensation to those who may be injured.

Limitations for Partial Disability

The primary purpose of Workmen's Compensation legislation is to provide compensation for actual disability.

Silicosis is disabling only when accompanied by active infection, and many of the states have adopted legislative provisions denying compensation for partial disability.

If the employee is not actually disabled, but is told that he is suffering from this disease, he worries, gives up his job, broods over his condition and eventually he and his family become public charges upon their community.

To this point, I quote the following statements contained in the Report on Medical Control of the National Silicosis Conference, Bulletin No. 21, Part 1, issued by the United States Department of Labor:

"A diagnosis of silicosis does not necessarily mean disability, and therefore a complete diagnosis should state whether a decreased capacity for work is evidenced, its cause, and an estimate of its degree."

"A complete diagnosis should furthermore state whether or not pulmonary infection is present, active, or latent, and if possible the causative organism."

and

"Attention is called to the fact that a diagnosis of silicosis does not necessarily mean disability. Silicosis is a slowly developing disease. Slight subjective symptoms and roentgenological evidence of pulmonary changes may be present for many years prior to the development of any measurable decreased capacity for work. In reports of investigations made in the United States, seldom has silicosis without pulmonary infection been found to produce serious disability."

A reason for the denial of partial disability compensation for silicosis is that the original award may place the claimant upon the compensation payroll for life. His case may be re-opened from time to time and increasing disability benefits awarded; eventually, even years after the termination of his employment, he may again re-open his case and apply for total disability benefits. To manufacturers and their insurance carriers this is a matter of serious concern and, the ultimate liability of the employer in such cases may well be indeterminable and, therefore, the risk uninsurable.

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Limitations for the Aggravation of an Existing Liability not Otherwise Compensable

A subject that has not received the legislative consideration that has been merited is that of apportioning disability when a compensable injury is aggravated by disease following such injury or when an occupational disease is aggravated by another disease or infirmity not in itself compensable. Many of the state laws provide that where an occupational disease is so aggravated by another disease or infirmity, the administrative agency must determine the portion of disability that is compensable and limit the compensation to such disability, without allowance for the aggravation by some other disease or physical defect.

CANADIAN COLUMNS

Mr. J. H. Vernon, General Manager of Western Clock Co. Ltd., Peterborough, solved the safety committee's problem by providing the committee with tags reading—

"Condemned by the Safety Committee. Do not use. This tag must not be removed until repair is made. It must then be returned to the Safety Committee with the foreman's signature."

Each morning the committee meets and all tags used are registered in the minutes and when the tag is returned with the foreman's signature on it, this is again recorded.

This method of enforcing the safety committee's recommendations has proved very successful—for example, take the screw machine department. One morning the foreman complained to Mr. Vernon because the committee had tagged nearly all the pails in his department and as a result work could not proceed.

The foreman was told that if he could not think of something to do, he had better send the men home and if he could not operate the plant properly, it would be closed down. The plant wasn't closed down for the foreman thought of something to do—make repairs.

These tags have taken from the management of the plant a whole lot of trouble.

Tags have been tied to an electric switch, a safety ladder with a broken rung, a power press where the safety device was out of order, chairs, etc., and repairs have been made promptly.

We learn that Mr. Fuller of Safety Supply Company, Toronto, is negotiating with the Surety Rubber Company, Carrollton, Ohio, for the manufacture of their patented 'Turncuff' rubber gloves in Canada.

The following letter sent to Safety Supply Company again shows the value of wearing Safe-T-Shoes with steel toes.

"In reply to your letter of September 8th, 1939, regarding an accident happening to our employee M. A. Garnish, wish to advise that he prevented a serious toe injury by wearing a pair of your Safety Shoes.

"Mr. Garnish was removing a piston from one of our machines, and while easing the piston out of the cylinder it dropped 30" striking directly on the Safety Toe of his right shoe. The piston weighed 100#, and the only injury was a slightly bruised toe. Without Safety Shoes this would have resulted in a lost time accident." Signed: Firestone Tire & Rubber Co. of Canada Ltd., Hamilton, Canada.

Is everything in order for the winter season? Have you checked your supplies, apparatus, and equipment? Now's the time!

Now you can obtain two types of protection in 1 respirator. Three new chemical cartridges (described below and shown above at left) are *easily interchangeable* with the dust cartridge shown above at the right.

The chemical cartridges are long-lived, thoroughly tested. A special separator on the inlet side permits full use of absorption medium. The wearer breathes easily . . . is not subjected to objectionable odors . . . does not have vision obstructed, with or without goggles.

Workers in fumes and vapors may now have the same comfortable protection as workers in Type A Dusts . . . plus the new double headband. *Write for new bulletin.*

3 NEW CHEMICAL CARTRIDGES

FOR NON-LETHAL CONCENTRATIONS OF FUMES AND VAPORS

CC-1 Fill . . . For use against low concentrations of fumes and gases encountered in paint spraying, and other light organic vapors.

CC-2 Fill . . . For use against low concentrations of acid gases.

CC-3 Fill . . . For use against low concentrations of acid organic gases.

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CEMENT HAZARDS

(Continued from page 13)

be permitted to remain in the ear from day to day; adequate washing will prevent such accumulation. Prevention of ear trouble is easily accomplished by proper hygiene methods—provision of sanitary facilities, and regulations to insure their use. Whenever excessive wax or dust does accumulate in the ear of a worker, it should be carefully removed by a physician or nurse. Great harm can result from the workers' attempts to remove excessive accumulations of wax from their ears.

Summarizing the five major types of occupational hazard in the cement industry, it is found that there are fairly definite hazards that respond nicely to proper preventive measure. Because it's always easier and cheaper to prevent such disabilities than to pay compensation, note the comparative ease with which preventive measures can be installed in the cement plant.

COMPRESSED GASES

(Continued from page 27)

valve a fraction of a turn, the pressure will soon "build up" to the same pressure as that in the source of supply. Or, if the tank supplies an air motor it will be difficult to maintain a uniform pressure. Constant manipulation of the supply valve will be necessary, unless an automatic regulator is provided. It is the same with oxygen and other industrial gases. An apparatus is necessary which will definitely check the flow of gas as soon as the pressure on the low side has reach a predetermined figure. The pressure regulator does this automatically.

It is possible to detect leaks in all cutting and welding equipment, including regulators, torches, and hoses. Acetylene has an odor which is very easily detected, but in locating the leak, soapy water should be employed. No leaks should be allowed to continue, inasmuch as a spark from a cutting and welding torch might ignite the gas.

Clothing and suitable protection for the eyes, hands and feet are important safety factors in oxy-acetylene welding and cutting. One-piece overalls closely fitting at the neck and wrists are recommended. They should be free of holes and rags. A ragged suit is dangerous because it invites fires and burns.

High shoes with tongues, laced to the top, may be worn, provided the overalls cover the uppers. Broken shoes are a hazard because of the possibility of sparks and drops of molten metal falling into the holes and burning the feet.

Gloves with gauntlets are necessary to protect the hands and wrists from the heat.

In conclusion—the welder should use care and discretion in handling equipment and gases for their use. There are fixed laws that govern the use of oxy-acetylene apparatus the same as in everything else.

In the larger industrial plants those employed in using oxy-acetylene equipment are trained operators and are the only ones allowed to use the apparatus, which has greatly assisted safety engineers. So, through complete cooperation of those concerned, the advancement of safety in industry can continue to progress.

Now you can obtain two types of protection in 1 respirator. Three new chemical cartridges (described below and shown above at left) are *easily interchangeable* with the dust cartridge shown above at the right.

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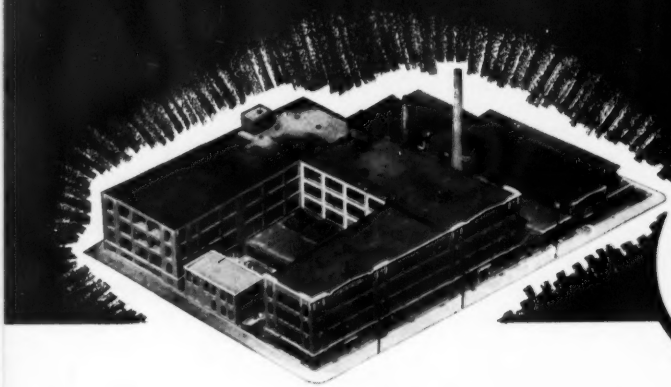

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